

IN THE CLAIMS

Please replace all prior versions, and listings, of claims in the application with the following complete list of claims. Insertions are indicated by underlining and deletions are indicated by strikeouts and/or double bracketing.

1-156. (Cancelled).

157. (Currently Amended) A system as in claim ~~174~~ 163, further comprising means for controlling the temperature of the chamber to maintain a temperature suitable for cultivating cells to generate the protein resulting from interaction of the cells with oxygen and/or nutrients and/or other components.

158. (Currently Amended) A system as in claim ~~174~~ 163, the chamber having a volume of less than about 100 microliters.

159. (Previously Presented) A system as in claim 158, the chamber having a volume of less than about 10 microliters.

160. (Previously Presented) A system as in claim 159, the chamber having a volume of less than about 1 microliter.

161. (Currently Amended) A system as in claim ~~174~~ 163, further comprising a mixing unit fluidly connectable to the inlet of the chamber, the mixing unit including an outlet connectable to the inlet of the reaction chamber, a plurality of inlets each in fluid communication with the outlet and a mixing chamber between plurality of inlets and of the outlet.

162. (Previously Presented) A system as in claim 161, wherein the mixing unit chamber is free of active mixing elements.

163. (Currently Amended) A system ~~as in claim 174, further~~ for maintaining and cultivating cells in culture and obtaining a protein resulting from interaction of the cells with oxygen and/or nutrients and/or other components, comprising:

a small-scale chemical or biochemical reactor comprising a plastic substrate comprising a plurality of reaction units constructed to operate in parallel, each reaction unit comprising an inlet, an outlet, and a fluid pathway connecting the inlet and the outlet, the fluid pathway comprising a chamber having a surface suitable for cell growth and a volume of less than about 1 ml, the chamber being constructed and arranged to maintain and cultivate cells in culture, the chamber further comprising an inlet fluidly connectable to a source of nutrients for the cells having a controlled pH, and an outlet for release of the protein resulting from the interaction involving the cells in the chamber;

a membrane defining at least one wall of the fluid pathway;

an enclosure positioned proximate the membrane, wherein at least one product of the interaction involving cells in the chamber passes across the membrane into the enclosure;
and

a heating unit having an inlet, and an outlet connectable to the inlet of the chamber, the heating unit separable from and attachable to the chamber.

164. (Currently Amended) A system ~~as in claim 174,~~ for maintaining and cultivating cells in culture and obtaining a protein resulting from interaction of the cells with oxygen and/or nutrients and/or other components, comprising:

a small-scale chemical or biochemical reactor comprising a plastic substrate comprising a plurality of reaction units constructed to operate in parallel, each reaction unit comprising an inlet, an outlet, and a fluid pathway connecting the inlet and the outlet, the fluid pathway comprising a chamber having a surface suitable for cell growth and a volume of less than about 1 ml, the chamber being constructed and arranged to maintain and cultivate cells in culture, the chamber further comprising an inlet fluidly connectable to a source of nutrients for the cells having a controlled pH, and an outlet for release of the

protein resulting from the interaction involving the cells in the chamber;

a membrane defining at least one wall of the fluid pathway;

an enclosure positioned proximate the membrane, wherein at least one product of the interaction involving cells in the chamber passes across the membrane into the enclosure;

the reactor further comprising sensors each of temperature, pH, and oxygen concentration.

165. (Currently Amended) A system as in claim ~~174~~ 163, the reactor further comprising a temperature sensor.

166. (Currently Amended) A system ~~as in claim 174~~, for maintaining and cultivating cells in culture and obtaining a protein resulting from interaction of the cells with oxygen and/or nutrients and/or other components, comprising:

a small-scale chemical or biochemical reactor comprising a plastic substrate comprising a plurality of reaction units constructed to operate in parallel, each reaction unit comprising an inlet, an outlet, and a fluid pathway connecting the inlet and the outlet, the fluid pathway comprising a chamber having a surface suitable for cell growth and a volume of less than about 1 ml, the chamber being constructed and arranged to maintain and cultivate cells in culture, the chamber further comprising an inlet fluidly connectable to a source of nutrients for the cells having a controlled pH, and an outlet for release of the protein resulting from the interaction involving the cells in the chamber;

a membrane defining at least one wall of the fluid pathway;

an enclosure positioned proximate the membrane, wherein at least one product of the interaction involving cells in the chamber passes across the membrane into the enclosure;

the reactor further comprising a pH sensor.

167. (Currently Amended) A system ~~as in claim 174~~, for maintaining and cultivating cells in culture and obtaining a protein resulting from interaction of the cells with oxygen and/or nutrients and/or other components, comprising:

a small-scale chemical or biochemical reactor comprising a plastic substrate comprising a plurality of reaction units constructed to operate in parallel, each reaction unit comprising an inlet, an outlet, and a fluid pathway connecting the inlet and the outlet, the fluid pathway comprising a chamber having a surface suitable for cell growth and a volume of less than about 1 ml, the chamber being constructed and arranged to maintain and cultivate cells in culture, the chamber further comprising an inlet fluidly connectable to a source of nutrients for the cells having a controlled pH, and an outlet for release of the protein resulting from the interaction involving the cells in the chamber;

a membrane defining at least one wall of the fluid pathway;

an enclosure positioned proximate the membrane, wherein at least one product of the interaction involving cells in the chamber passes across the membrane into the enclosure;

the reactor further comprising an oxygen sensor.

168. (Currently Amended) A system as in claim 163, wherein the plurality of reaction units are attachable to and separable from each other, constructed and arranged to operate in parallel.
169. (Currently Amended) A system as in claim 163, comprising at least 10 reaction units constructed to operate in parallel.
170. (Previously Presented) A system as in claim 169, comprising at least 100 reaction chambers constructed to operate in parallel.
171. (Previously Presented) A system as in claim 170, comprising at least 500 reaction chambers constructed to operate in parallel.
172. (Previously Presented) A system as in claim 171, comprising at least 1,000 reaction chambers constructed to operate in parallel.

173. (Previously Presented) A system as in claim 172, comprising at least 10,000 reaction chambers constructed to operate in parallel.
- 174-175. (Cancelled)
176. (New) A system as in claim 164, further comprising means for controlling the temperature of the chamber to maintain a temperature suitable for cultivating cells to generate the protein resulting from interaction of the cells with oxygen and/or nutrients and/or other components.
177. (New) A system as in claim 164, the chamber having a volume of less than about 100 microliters.
178. (New) A system as in claim 177, the chamber having a volume of less than about 10 microliters.
179. (New) A system as in claim 178, the chamber having a volume of less than about 1 microliter.
180. (New) A system as in claim 164, further comprising a mixing unit fluidly connectable to the inlet of the chamber, the mixing unit including an outlet connectable to the inlet of the reaction chamber, a plurality of inlets each in fluid communication with the outlet and a mixing chamber between plurality of inlets and of the outlet.
181. (New) A system as in claim 180, wherein the mixing unit chamber is free of active mixing elements.
182. (New) A system as in claim 164, the reactor further comprising a temperature sensor.

183. (New) A system as in claim 164, wherein the plurality of reaction units are attachable to and separable from each other, constructed and arranged to operate in parallel.
184. (New) A system as in claim 166, further comprising means for controlling the temperature of the chamber to maintain a temperature suitable for cultivating cells to generate the protein resulting from interaction of the cells with oxygen and/or nutrients and/or other components.
185. (New) A system as in claim 166, the chamber having a volume of less than about 100 microliters.
186. (New) A system as in claim 185, the chamber having a volume of less than about 10 microliters.
187. (New) A system as in claim 186, the chamber having a volume of less than about 1 microliter.
188. (New) A system as in claim 166, further comprising a mixing unit fluidly connectable to the inlet of the chamber, the mixing unit including an outlet connectable to the inlet of the reaction chamber, a plurality of inlets each in fluid communication with the outlet and a mixing chamber between plurality of inlets and of the outlet.
189. (New) A system as in claim 188, wherein the mixing unit chamber is free of active mixing elements.
190. (New) A system as in claim 166, the reactor further comprising a temperature sensor.
191. (New) A system as in claim 166, wherein the plurality of reaction units are attachable to and separable from each other, constructed and arranged to operate in parallel.

192. (New) A system as in claim 167, further comprising means for controlling the temperature of the chamber to maintain a temperature suitable for cultivating cells to generate the protein resulting from interaction of the cells with oxygen and/or nutrients and/or other components.
193. (New) A system as in claim 167, the chamber having a volume of less than about 100 microliters.
194. (New) A system as in claim 193, the chamber having a volume of less than about 10 microliters.
195. (New) A system as in claim 194, the chamber having a volume of less than about 1 microliter.
196. (New) A system as in claim 167, further comprising a mixing unit fluidly connectable to the inlet of the chamber, the mixing unit including an outlet connectable to the inlet of the reaction chamber, a plurality of inlets each in fluid communication with the outlet and a mixing chamber between plurality of inlets and of the outlet.
197. (New) A system as in claim 196, wherein the mixing unit chamber is free of active mixing elements.
198. (New) A system as in claim 167, the reactor further comprising a temperature sensor.
199. (New) A system as in claim 167, wherein the plurality of reaction units are attachable to and separable from each other, constructed and arranged to operate in parallel.